ASIA–PACIFIC POPULATION & POLICY

Assessing the Effects of Population Change, Economic Growth, and Globalization on Income Inequality

During the past half-century, life expectancy has gone up and fertility has gone down in nearly every country of the world. Social modernization, economic development, and dramatic breakthroughs in health and family planning technology have been the fundamental forces driving this "demographic transition."

Several studies have documented how the transition from high to low mortality and fertility provides favorable conditions for economic growth. But how are the benefits of the demographic transition distributed?

A number of studies in this area have focused on trends in the United States. A large international data set now makes it possible to extend this research to the global level.

A recent analysis—covering income-inequality data from 92 countries over four decades—suggests that inequality tends to increase at early stages of economic development and fall at later stages. The most important determinant of inequality is not economic growth, however, but rather changes in population age structure that occur in the course of the demographic transition. Policies that favor economic globalization do not seem to have a strong impact on income inequality.

This issue of *Asia-Pacific Population & Policy* summarizes the results of this analysis of global income inequality. It is based on a paper by the same authors published in the December 2002 issue of *Southeast Asian Studies*.

INCOME INEQUALITY: PATTERNS AND TRENDS

Klaus Deininger and Lyn Squire (1996) compiled a global data set on income inequality based on published household surveys that provide full coverage of national populations and comprehensive measures of income or expenditure. The data set includes 682 annual observations from 111 countries. After excluding 19 countries with insufficient economic data, the analysis presented here is based on 600 annual observations from 92 countries over the 1960s to the 1990s.

The discussion focuses on two measures of inequality. One is the Gini coefficient, which is a number between 0 and 100, where 0 means perfect equality (everyone has the same income) and 100 means perfect inequality (one person has all the income, and everyone else gets nothing). The second measure is the ratio of the total income of the richest 20 percent (quintile) of the population to the total income of the poorest 20 percent (Q5/Q1). If the richest earn the same as the poorest (everyone has the same income), the Q5/Q1 ratio will be 1.

Based on these two measures, income inequality in 92 countries follows

the expected regional patterns (Table 1). Inequality is high in Latin America and sub-Saharan Africa and much lower in developed countries and in countries of East Asia and the Pacific Rim. Within regions, inequality displays little apparent variation over the four decades apart from the Q5/Q1 income ratio in Latin America, which goes down. Changes in data availability, however, make it difficult to draw firm conclusions about regional trends over time.

EXPLAINING INEQUALITY: THREE HYPOTHESES

Inequality and population age structure. One explanation for differences in inequality between countries and over time relates to the demographic transition. Declines in fertility produce large changes in population age structure. During the early stages of the transition, the proportion of the working-age population at relatively young ages is high, the result of high fertility in recent decades. Later in the transition, the proportion of older workers increases.

How does this affect income inequality? Middle-aged workers tend to earn more than young workers because they have more experience. At the same time, workers who are relatively scarce can command higher wages than workers who glut the market. When young workers are abundant, their incomes—which already tend to be low—drop further below the incomes of middle-aged workers, increasing inequality. When middle-aged workers are abundant, their higher incomes tend to go down, approaching the lower income levels of young workers and thus reducing inequality.

Inequality, technology, and structural change. Nearly 50 years ago, Simon Kuznets (1955) hypothesized that technological development, industrializa-

Table 1 Income inequality: Patterns by region and decade

	1960s	1970s	1980s	1990s
Developed countries[a]				
Gini coefficient	34.7 (7.86)	33.6 (5.72)	32.6 (4.30)	33.0 (4.86)
Q5/Q1 income ratio	6.94 (3.73)	6.64 (2.60)	6.20 (1.79)	6.49 (2.28)
Number of countries	12	19	20	13
East Asia and Pacific Rim[b]				
Gini coefficient	37.4 (7.05)	39.0 (7.03)	38.5 (6.76)	39.2 (7.45)
Q5/Q1 income ratio	8.28 (3.89)	8.96 (3.98)	7.88 (3.10)	8.14 (4.25)
Number of countries	6	9	10	7
Latin America[c]				
Gini coefficient	53.6 (5.26)	50.4 (4.94)	50.1 (5.47)	50.0 (5.35)
Q5/Q1 income ratio	21.2 (10.9)	17.0 (6.54)	16.2 (5.26)	13.3 (3.30)
Number of countries	6	12	12	10
Sub-Saharan Africa[d]				
Gini coefficient	45.3 (10.5)	49.8 (8.39)	41.6 (7.74)	46.4 (9.35)
Q5/Q1 income ratio	12.2 (9.01)	17.5 (3.17)	9.63 (5.81)	12.9 (8.91)
Number of countries	4	4	11	15

Note: Mean values, with standard deviations in parentheses. For each decade-region pair, the number of countries with available inequality data is indicated under that line item. Apparent trends in inequality over time may not be meaningful because they may simply reflect changes in data availability.

[a]Developed countries include members of the Organization for Economic Cooperation and Development (OECD): Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Turkey, United Kingdom, and United States.

[b]East Asian and Pacific Rim countries include China, Hong Kong, Indonesia, Japan, South Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand.

[c]Latin American countries include Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Puerto Rico, and Venezuela.

[d]Sub-Saharan African countries include Botswana, Cameroon, Central African Republic, Côte d'Ivoire, Gabon, Ghana, Guinea-Bissau, Kenya, Lesotho, Madagascar, Mauritania, Mauritius, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe.

tion, and urbanization tend to increase the demand for capital and highly paid skilled labor, while lowering the demand for low-paid unskilled labor. As economies mature, the rate of technological and structural change slows down. As a result, income inequality first rises and then declines with economic development.

This pattern can be reinforced or offset by the demographic forces just cited. The demographic transition may glut the labor market with young workers at early stages of economic devel-

opment, reducing their wages and contributing to a rise in inequality. Or the out-migration of young workers to labor-scarce economies may have the opposite effect, increasing the wages of those young workers who stay at home and thus reducing inequality.

With social and economic modernization, women tend to join the labor force in greater numbers. This may increase inequality because women tend to earn less than men and they are most likely to participate in the workforce when they are young and inexperienced.

Inequality and globalization. Standard trade models assume that each country benefits by exporting products using factors of production that are relatively abundant and cheap. Thus, globalization should benefit relatively abundant unskilled workers in poor countries, reducing income inequality. By contrast, increased international trade should benefit relatively abundant skilled workers in rich countries, increasing inequality. Migration of unskilled workers from poor to rich countries should have the same effect, raising income inequality in rich countries and lowering it in poor countries.

A country's natural-resource endowment may also play a role. Increasing exports of a natural resource augment the income of those who own or control it. Because this group tends to be wealthy, expanding exports of a natural resource may increase inequality.

TESTING THE HYPOTHESES

To test the effects of the demographic transition on income inequality, the analysis begins by calculating the fraction of each country's working-age population (age 15–69) that is in the peak earning years (age 40–59). The relative size of this age group has varied within regions over the past four decades but especially across regions, remaining far higher in developed countries than elsewhere (Table 2). The mature adult share of the labor force appears to rise substantially only during the later stages of the demographic transition.

To analyze the effects of technological modernization and structural change, real gross domestic product (GDP) per worker is used as a proxy for a constellation of variables that Kuznets summarized as unskilled labor saving. From the 1960s to the 1990s, real GDP per worker, measured in US dollars at purchasing-power parity,

Table 2 Population age structure, worker productivity, and economic openness: Patterns by region and decade

	1960s	1970s	1980s	1990s
Developed countries				
Percentage 40–59[a]	34.3 (2.92)	32.9 (2.14)	32.4 (2.93)	33.8 (3.04)
Real GDP per worker[b]	$16,194	$21,734	$24,860	$28,083
	($5,836)	($5,999)	($6,052)	($6,835)
Openness index[c]	0.83 (0.34)	0.90 (0.31)	0.93 (0.24)	1.0 (0.0)
East Asia and Pacific Rim				
Percentage 40–59[a]	27.4 (2.47)	26.8 (3.05)	26.5 (3.91)	27.9 (4.42)
Real GDP per worker[b]	$3,995	$6,995	$10,472	$14,612
	($2,071)	($4,166)	($6,341)	($9,046)
Openness index[c]	0.49 (0.38)	0.90 (0.32)	0.90 (0.32)	0.90 (0.32)
Latin America				
Percentage 40–59[a]	25.2 (1.47)	24.3 (1.20)	23.8 (1.92)	24.3 (2.24)
Real GDP per worker[b]	$8,059	$10,413	$10,364	$9,334
	($5,109)	($5,565)	($5,173)	($4,217)
Openness index[c]	0.32 (0.41)	0.23 (0.41)	0.27 (0.35)	0.82 (0.28)
Sub-Saharan Africa				
Percentage 40–59[a]	25.5 (2.20)	25.3 (1.99)	24.4 (2.07)	23.7 (1.95)
Real GDP per worker[b]	$2,398	$3,272	$3,490	$3,380
	($1,765)	($2,584)	($2,755)	($3,056)
Openness index[c]	0.03 (0.11)	0.05 (0.21)	0.14 (0.31)	0.32 (0.45)

Note: Mean values, with standard deviations in parentheses. See Table 1 for countries included in the four regions. All available data are used, even if no corresponding inequality data are available for some decade-country pairs.

[a]Percentage of the population age 15–69 that is in the age group 40–59.

[b]In US dollars at purchasing-power parity.

[c]Index developed by J. Sachs and A. Warner (Economic reform and the process of global integration, *Brookings Papers on Economic Activity* 1: 1995). Open = 1, and closed = 0. See text for the four criteria on which the index is based.

grew rapidly in East Asia and the Pacific Rim, grew moderately in the developed countries, and stagnated in sub-Saharan Africa and Latin America (Table 2).

Openness is measured by classifying an economy as closed if: (1) there is a black-market premium of 20 percent or more for foreign exchange; (2) an export-marketing board appropriates most foreign-exchange earnings; (3) the economic system is socialist; or (4) extensive nontariff barriers restrict the importation of intermediate and capital goods. According to this classification, the developed countries have been quite open since the 1960s, East Asia

and the Pacific Rim became open in the 1970s, Latin America became open in the 1990s, and sub-Saharan Africa remains closed (Table 2).

An empirical model is applied to the inequality data compiled by Deininger and Squire to test the effects on income inequality of: (1) the demographic transition; (2) technological and structural change; and (3) economic openness. To assess the robustness of the results, the analysis considers the stability of the estimated relationships over time, explores alternative measures of population age structure, adds several variables identified in the literature as potential determinants of inequality,

Table 3 Estimated effects of population age structure, worker productivity, and economic openness on income inequality

	Gini coefficient	Q5/Q1 income ratio
Percentage 40–59	–1.15**	–0.0657**
Real GDP per worker	0.739**	0.0461**
Real GDP per worker squared	–0.0257**	–0.00138**
Openness index	–3.74*	–0.152

Note: GDP per worker is measured in units of $1,000. Real GDP per worker and real GDP per worker squared, taken together, depict a curve in which inequality first goes up and then goes down with economic development. The estimated turning point, when income inequality stops increasing and starts decreasing, is quite high, at about $15,000 in 1985 prices at purchasing-power parity.

** Significant at the 1 percent level. *Significant at the 5 percent level.

and experiments with alternative measures of openness.

This analysis yields emphatic support for the effect of population age structure on income inequality (Table 3). A large proportion of the working-age population in the 40–59-year age group lowers income inequality, as measured by both the Gini coefficient and the Q5/Q5 ratio. A one-standard-deviation increase in the proportion age 40–59 lowers a country's Gini coefficient by 6.5 points. The effect is very large and is statistically significant at the 1 percent level.

Taken alone, technological and structural modernization, as measured by real GDP per worker, does not have a consistent, significant effect on income inequality (not shown). With population age structure included in the model, however, labor-saving modernization has the predicted effect. Inequality rises in the early stages of economic development—up to an annual GDP per worker of about US$15,000—as the effects of real GDP per worker dominate. At later stages of economic growth, the effects of real GDP per worker squared begin to dominate, and income inequality falls. The results are statistically significant at the 1 percent level.

The analysis does not support the view that economic openness is closely connected with changes in income inequality. In the model, openness affects inequality, but the impact is small and only significant for the Gini coefficient and only at the 5 percent level. An economy rated as fully open would have a Gini coefficient only 3.5 points lower than that of an economy rated as fully closed.

In all refinements of the model (not shown), population age structure has a consistent and powerful effect—inequality falls sharply as the working-age population matures. The results also provide considerable support for the role of technological and structural change—inequality increases and then decreases as labor productivity improves. Variations of the model provide only limited support, however, for the hypothesis that economic openness brings changes in inequality.

POLICY CONSIDERATIONS

The coming decades will witness substantial convergence in regional population age structures as birth and death rates continue to fall in the developing world. In the countries of Latin America and East Asia and the Pacific Rim, the proportion of the working-age population in the 40–59-year age group will increase rapidly between 1995 and 2025. In Latin America, a further, more

modest increase is expected between 2025 and 2050. In Africa, by contrast, the proportion in the 40–59-year age group will increase only modestly up to 2025 and then much more quickly between 2025 and 2050. In the developed countries, there will be a modest increase up to 2025, followed by a slight decline.

The results of this analysis suggest that these demographic changes will be a powerful force promoting reduced inequality throughout the world. The changes should be largest in the developing countries—reducing but not eliminating the gap in income inequality between Africa and Latin America on the one hand and the developed countries, East Asia, and the Pacific Rim on the other.

Public policy can also play a role. In poor countries, a commitment to expand education may augment the supply of skilled labor, which will tend to erode the premium on skills and reduce wage inequality. Policies to reduce income differences between men and women should have the same effect. This analysis also suggests that policies and programs that make family planning widely available in developing countries will contribute to a reduction in income inequality by helping to jump-start the demographic transition.

FURTHER READING

Deininger, Klaus, and Lyn Squire. 1996. A new data set measuring income inequality. *World Bank Economic Review* 10:565–91.

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